

ABSTRACT OF THE DISCLOSURE

Improvements in accurately sensing a user manipulandum of a force feedback device. A force feedback device, coupled to a host computer, includes an actuator for outputting forces on a manipulandum and a sensor for detecting a position of the manipulandum. In one feature, a raw sensor value representing manipulandum position is adjusted based on compliance between sensor and manipulandum, where the adjustment can be based on a compliance constant and an output force. In another feature, a range of motion of the manipulandum is dynamically calibrated from startup. One boundary value of an assigned initial range is set equal to a received sensor value if the sensor value is outside the initial range, and the other boundary value is adjusted to maintain the size of the initial range unless the other boundary value has already been sensed outside the initial range. In another feature, manipulandum position is accurately sensed by filtering raw sensor values for overshoot values occurring at limits to manipulandum motion and using the filtered value in the dynamic calibration. In another feature, sensing inaccuracies caused by compliance in the device are decreased by normalizing a raw sensor value to a normalized range of motion that includes a saturation zone at each end of the range that adjusts sensor values over a saturation level to the saturation level.